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DEPARTMENT : **CHEMISTRY**

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TITLE : **SYNTHESIS CHARACTERIZATION AND BIOLOGICAL ACTIVITY OF COORDINATION POLYMERS OF TRANSITION METAL IONS**

ABSTRACT

The present thesis deals with the synthesis and characterization of the coordination polymers of transition metal ions with their antimicrobial activities. The chapters in this thesis involve the synthesis of different coordination polymers with multidentate donor sites (oxygen and nitrogen), with transition metal ions. The coordination polymers are of great interest due to presence of azomethine linkage in the polymeric backbone and their ability to coordinate the central atom with surrounding atoms, ions or molecules. The incorporation of metal ions in the polymeric backbone not only affects their physical properties but also alters the chemical properties of the polymers. A series of polymeric Schiff base metal complexes having azomethine linkage based on ethylenediamine, 1,2-phenylenediamine, ortho-aminophenol and amino acids have been synthesized. The polymer metal complexes have been synthesized by using the compounds with biological importance like glutaraldehyde, glyoxal, salicylaldehyde 2-hydroxyacetophenone and formaldehyde. All the synthesized polymeric Schiff base and their metal complexes were characterized by elemental analysis, spectral studies (UV-Visible, FTIR, ^{1}H and $^{13}CNMR$) and thermal studies. The ligand field splitting parameters 10Dq, the interelectronic repulsion parameter B and nephelauxetic parameter β have been calculated

for polymer metal complexes having octahedral geometry. The thermogravimetric analysis of synthesized polymer metal complexes was studied by TGA in nitrogen atmosphere upto 800℃ and 1000℃. The antimicrobial activity of all the synthesized polymer metal complexes was investigated against some bacterial and fungal strains such as *Staphylococcus aureus, Escerishia coli, Bacillus subtilis, Salmonella typhimurium, Fusarium oryzae, Candida albicans, Aspergillus niger* etc. All the metal complexes were found to be more thermally stable and showed high antimicrobial activity as compare to the polymeric Schiff base. It has been concluded that due to heat resistant property, coordination polymers can be easily used in fire-resistant fabrics, coatings in electronics devices, aerospace adhesives, and ablation shields. Recent advances in polymer-based bioimaging probes have increased their specificity and therapeutic potential. The application of polymers to bioimaging is still in its infancy, and much work remains to be done, including standardization of methods, improvements in image analysis, and characterization of the accuracy or reproducibility of imaging methods and techniques. Microbes which are present in environment are big cause of infectious diseases, which can be prevented by using surface coating. These coated surfaces are capable of killing microbes on contact. Long-term advantages of this process found a substantial decrement in the use of antibiotics. This work is directed towards a double objective to kill air born microbes and to prevent growth of marine fouling on the underwater hulls of vessels by using antimicrobial coating. Future aerospace missions will bring forth new environmental protective requirements. New and improved ablative polymeric materials must therefore be developed for these applications, because of the need for greater weight efficiency and the property imbalances which exist in present-day ablators.